The paper by Mijling et al. uses a novel approach to derive monthly emissions of NOx over East Asia using the GOME-2 data and CHIMERE model. It analyzes the recent trends in different provinces of China and other regions/countries in East Asia. It is a step forward toward better understanding of Chinese emissions in different provinces and their relationship with the different states and growth rates of economics, industry and urbanization. The paper is within to scope of ACP. There are some issues that need to be addressed.

The paper analyzes not just China but also other countries. So the introduction should reflect this point.

The use of GOME-2 data instead of OMI may be a concern, since OMI provides more data coverage and the results have been validated by Boersma et al. (2011).

Please give some more analyses of the GOME-2 retrieval, CHIMERE simulation (e.g., model convection, PBL mixing, emission setups), and the mapping between them. Uncertainties in satellite data should be discussed more explicitly. While some of the info may be described elsewhere, an analysis/discussion here will help readers understand the significance and uncertainty of emission results here.

It is not clear to me how can a 0.25x0.25 degree map be made appropriately when the footprint of GOME-2 is at least 40x80 km. In addition, due to the footprint of GOME-2 and the limited amount of valid satellite pixels for each month, emission results for some small provinces like Beijing are likely affected by errors in attributing satellite NO2 to individual provinces for pixels around the provincial borders. A brief discussion will be helpful.

The use of daily data may have its cons, as daily NO2 data are noisier than monthly data. Please discuss.

Sect. 3: It is better to make a table to present previous top-down emission estimates.

The likely time lag in the derived emissions (as shown in Sect. 4.2 and Figs. 4-5) is a concern and potentially points to errors in the underlying assumptions of DESCO. This issue needs to be addressed.

In Sect. 4.2, lightning emissions are comparable to soil emissions (Lin, 2012) and should be analyzed. Lightning emissions also peak in summer (with more convection and precipitation). In addition, with so many assumptions, it will be helpful to discuss uncertainties in the estimated contributions of anthropogenic/natural sources.

Specific comments:

P17524,L5: Should be Lin et al. (2012). In addition, Lin et al. (2012) show significant sensitivity of model NO2 to many other parameters (in addition to clouds and HO2 uptake).

P17524,L13: please explain why an earlier overpass time can reduce the effect. Also, emission trends may be affected by model biases since the biases are not exactly constant in time.

P17526,L20: A figure is better to present such results.

P17529,L17: what might be the causes of such time lag?

P17530,L14: 'remarkably constant' is an overstatement since the standard deviation of the ratio is about 30% of the mean value.

P17533,L2: the fractional values may not be 'lower limit values', although the absolute concentration maybe.